BISS Biodiversity Information Science and Standards

Biodiversity Information Science and Standards 9: e178687
doi: 10.3897/biss.9.178687

OPEN ACCESS

Conference Abstract

# Mobilising Legacy Georeferencing Efforts

Ashleigh Whittaker‡, Jack Plummer‡, Nicky Nicolson‡

‡ Royal Botanic Gardens, Kew, London, United Kingdom

Corresponding author: Ashleigh Whittaker (a.whittaker@kew.org), Jack Plummer (j.plummer@kew.org), Nicky Nicolson (n.nicolson@kew.org)

Received: 19 Nov 2025 | Published: 20 Nov 2025

Citation: Whittaker A, Plummer J, Nicolson N (2025) Mobilising Legacy Georeferencing Efforts. Biodiversity Information Science and Standards 9: e178687. https://doi.org/10.3897/biss.9.178687

## Abstract

As we progress towards a globally accessible natural history collection, the ways in which we digitally curate, share and use our data will inevitably change. Digital specimen records enable access by in-country experts, increase the opportunity for specimen enhancement by the scientific community, and improve the breadth of research to which the specimens contribute.

Digitisation workflows capture an image often with minimal transcription; they do not include the further enhancement of specimen records, such as georeferencing - the addition of coordinates to text based locality information. Typically used to georeference herbarium specimens, the point radius method assigns a coordinate and a measurement of maximum uncertainty (Wieczorek and Chapman 2020). Some herbarium specimens that lack coordinates still cannot be georeferenced using this method due to poor label data or the unavailability of contextual information.

Data derived from herbarium specimens form the basis of species distribution modelling, taxonomic research and IUCN extinction risk assessments. If a specimen record does not have coordinates, then it is often discarded early in the data mining process, highlighting the importance of data enhancement through georeferencing, which confirms the species occurrence in space and time.

The Kunming-Montreal Global Biodiversity Framework targets help to guide the most important applications of collection data for biodiversity conservation; Target 4, for example, aims to halt species extinction and protect genetic diversity (Convention on

© Whittaker A et al. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Biological Diversity 2023). Extinction risk assessments of plant species are underpinned by distribution maps derived from preserved specimens and observation records with coordinate information either recorded at the time of collection or through subsequent georeferencing of the specimen. However, over half of all herbarium specimens on Global Biodiversity Information Facility (GBIF) do not have coordinates and so robust extinction risk assessments often require a georeferencing step before applying the IUCN's criteria. Other data types contributing to extinction risk assessment, such as population size and trend are often lacking and, where available, subjective and restricted to an expert's firsthand knowledge of the species, making the data untraceable for the wider community (Nic Lughadha et al. 2019, Willis et al. 2003).

As highlighted in Bloom et al. (2018), the estimated distribution of a species differs depending on the origin of the coordinate data. For example, non-georeferenced records tend to inflate the estimated distribution of a species. Working with collaborators with regional geographical expertise, and using datasets following standardised protocols, will more likely result in accurate and precise georeferenced records.

As herbarium specimen labels can contain qualitative context on collection localities, the process of georeferencing is subjective and so an indicator of confidence and the georeferencer's method is important for end user trust and usability of the record. As more herbarium specimens are digitised, there is a growing need to produce georeferenced locality data at scale.. Although there are robust tools that can be used to supplement manual georeferencing, georeferencing of all specimens in natural history collections currently lacking coordinates is not feasible to resource, as georeferencing is time and resource heavy.

The Royal Botanic Gardens, Kew now contributes 5.8 million herbarium specimen records to GBIF, many of which will have between three and six duplicate specimens located in herbaria around the world. Enhancing these records with existing georeferencing efforts accumulated through the completion of several thousand extinction risk assessments will reduce duplicated effort and uncover georeferenced localities that would otherwise go undocumented. This dataset will also help in establishing protocols to apply when georeferencing plant collections in the future, particularly in data-poor tropical regions.

## Keywords

herbarium specimens, digitisation, red list assessments

## Presenting author

Ashleigh Whittaker

## Presented at

Living Data 2025

## Conflicts of interest

The authors have declared that no competing interests exist.

## References


- Bloom TS, Flower A, DeChaine E (2018) Why georeferencing matters: Introducing a practical protocol to prepare species occurrence records for spatial analysis. Ecology and Evolution 8 (1): 765-777. https://doi.org/10.1002/ece3.3516
- Convention on Biological Diversity (2023) Kunming-Montreal Global Biodiversity Framework. https://www.cbd.int/gbf. Accessed on: 2025-11-14.
- Nic Lughadha E, Walker BE, Canteiro C, Chadburn H, Davis AP, Hargreaves S, Lucas EJ, Schuiteman A, Williams E, Bachman SP, Baines D, Barker A, Budden AP, Carretero J, Clarkson JJ, Roberts A, Rivers MC (2019) The use and misuse of herbarium specimens in evaluating plant extinction risks. Philosophical Transactions of the Royal Society B: Biological Sciences 374 (1763). https://doi.org/10.1098/rstb.2017.0402
- Wieczorek J, Chapman A (2020) Georeferencing Best Practices. GBIF Secretariat. https://doi.org/10.15468/doc-gg7h-s853
- Willis F, Moat J, Paton A (2003) Defining a role for herbarium data in Red List assessments: a case study of Plectranthus from eastern and southern tropical Africa. Biodiversity & Conservation 12 (7): 1537-1552. https://doi.org/10.1023/a:1023679329093